an interior portion of a material having a characteristic to be measured;

defining each of said paths by two distinct surface areas of said material, at least one of said surface areas of one of said paths being extended in length at substantially constant spacing from the other surface area of said one path;

sensing a plurality of independent signals developed at the same time or in rapid sequence representing optical information obtained from within said [specimen] material in response to said illumination passing along said different paths, each independent signal corresponding to a particular path; and

processing said signals in accordance with appropriate modeling techniques to [minimize inaccuracies in spectroscopic determination of] determine qualitative or [quantitive] quantitative characteristics of the [specimen] material.

Claim 2, line 2, change "providing" to --directing--;
delete "of the specimen";
line 3, after "different" delete
"independent".

Claim 3, line 2, change "providing" to --directing--;
delete "of the specimen";
line 3, after "different" delete
"independent".

Claim 4, line 2, change "providing" to --modulating--; delete "of the specimen modulated";
line 3, after "different" delete "independent";
line 4, change "one independent" to --the--; change "another" to --each different path--.

Claim 5, line 2, change "specimen" to --material--;
line 3, after "different" delete "independent";
line 4, change "one independent" to --the--; change "another" to --each different path--.

Claim 6, line 3, change "optical axis of the detection means" to --illuminated surface of said material--.

7. (3x Amended) Apparatus for [improving] optical interactance measurements of an interior portion of a material, said measurements being effected by passing illumination through portions of the material comprising:

aperture means for defining corresponding distinct illumination and detection surface areas for each of a plurality of transmission paths within said material, at least one surface

area of at least one of said transmission paths extending in a direction substantially transverse to the direction of illumination passage along said one transmission path and substantially constantly spaced from its corresponding surface area;

means for directing illumination onto said illumination surface areas and along said transmission paths;

means for sensing optical information indicative of said interior portion of said material and developed by illumination passing along said transmission paths at said detection surface areas of said ~~trans~~mission paths;

[means for providing illumination to a specimen having a characteristic to be measured;]

[means for sensing optical information developed by said illumination along a plurality of different paths through said illuminated specimen material while substantially excluding the sensing of optical information reflected from a surface of the material;]

means, responsive to said [sensed optical information] sensing means, for developing a plurality of independent signals corresponding in number to said plurality of paths, said signals representing said optical information obtained from said [specimen] material; and

means for processing said signals in accordance with appropriate modeling techniques to [minimize inaccuracies in

spectroscopic determination of] determine quantitative or qualitative characteristics of the [specimen] material.

8. (Amended) The apparatus of claim 7 including means for [providing] directing the illumination simultaneously along said paths.

9. (Amended) The apparatus of claim 7 including means for [providing] directing the illumination sequentially along said paths.

11. (Thrice Amended) Apparatus for improving optical interactance, [and] transmittance and reflectance measurements comprising:

an elongated probe having a body portion and a tip portion, the body portion comprising a central tubular element surrounded by an annular outer element;

the tip portion having a central aperture which communicates with said central tubular element and a plurality of rings which communicate with said annular outer element;

the rings in said tip portion being angled with respect to the longitudinal axis of the probe;

a number of fiber optic bundles whose number corresponds to said plurality of rings being disposed within said outer element, each bundle being arranged at one end to exit at a

respective ring and, at the other end, at least one such bundle being connected to a source of illumination; and

optical means disposed in the central tubular element for receiving optical information resulting from applied illumination to a specimen from said central aperture from different paths through a specimen and for conveying said information to a sensing device so as to develop signals representing said specimen optical information.

Cancel claims 20 and 21 without prejudice.

22. (Twice Amended) In a method of using apparatus for improving optical [interactance] <u>transmittance and reflectance</u> measurements comprising[,] means for providing illumination to a specimen having a characteristic to be measured along a plurality of different paths at a probe tip of said apparatus, means for sensing optical information, at a central aperture of said probe tip, developed by said illumination provided from an illuminated specimen, means, responsive to said sensed optical information, for developing a plurality of independent signals corresponding in number to said plurality of paths, said signals representing said optical information obtained from said specimen, and means for processing said signals in accordance with appropriate modeling techniques to minimize inaccuracies in spectroscopic determination of

quantitative or qualitative characteristics of the specimen, said method including the step of providing a further source of illumination, arranging said probe tip adjacent a near side of a specimen of small size, arranging the further source of illumination on a far side of said specimen, and using said probe tip so that reflected energy from said specimen is directed to said central aperture and/or energy transmitted by said further source through said specimen is directed to said central aperture.

24. (3x Amended) In a method of using apparatus for improving optical [interactance] <u>transmittance and reflectance</u> measurements comprising means for providing illumination to a specimen having a characteristic to be measured along a plurality of different paths at a probe tip of said apparatus, means for sensing optical information, at a central aperture of said probe tip, developed by said illumination provided from an illuminated specimen, means, responsive to said sensed optical information, for developing a plurality of independent signals corresponding in number to said plurality of paths, said signals representing said optical information obtained from said specimen, and means for processing said signals in accordance with appropriate modeling techniques to minimize inaccuracies in spectroscopic determination of quantitative or qualitative characteristics of the specimen, said method including the steps of providing a further detector for developing an electrical signal responsive

to illumination, arranging said probe tip adjacent [the] a near side of a specimen of small size, arranging said further detector on a far side of said specimen, and using said probe tip so that reflected energy from said specimen is directed to said central aperture and/or energy [transmittal] transmitted by probe is detected by said further detector.

26. (Twice Amended) Apparatus for improving optical interactance and transmittance [and reflectance] measurements comprising:

an elongated probe having a body portion and a tip portion, the body portion comprising a central tubular element surrounded by an annular outer element;

the tip portion having a central aperture which communicates with said central tubular element and a plurality of rings which communicate with said annular outer element;

the ring in said tip portion being angled with respect to the longitudinal axis of the probe;

a plurality of the fiber optic bundles whose number corresponds to said plurality of rings being disposed within said outer element, [at least one] each bundle being arranged at one end to exit at a respective ring for receiving [specimen] information relating to a particular material and, at the other end, adapted to be connected to a detector for developing s signal and

said central tubular element being connected at one end with a source of illumination, which illumination will exit at the central aperture;

whereby independent signals responsive to said illumination representing said [specimen] material information may be developed and whereby surface phenomena of said material may be excluded during measurement.

Add new claims 33-52 as follows:

--33. The method of claim 1 including the step of defining each of said paths by at least one extended surface area, an extended surface area of one of said paths being distinct and contained within the boundary defined by an extended surface area of another of said paths.

34. The method of claim 33 including the step of defining at least one of said paths and said surface areas by areas on opposite surfaces of said material.

35. The method of claim 1 wherein said steps of passing illumination and sensing steps are provided by an instrument for said interactance measurement and said method further includes the steps of moving said instrument a predetermined distance away from said material and performing a reflectance measurement of said material.

36. The apparatus of claim 7 wherein said aperture means are operative to define each of said paths by at least one extended surface area, an extended surface area of one of said paths being distinct and contained within the boundary defined by an extended surface area of another of said paths.

37. The apparatus of claim 36 wherein said aperture means are operative to define said surface areas of each of said paths to be parallel.

38. The apparatus of claim 36 wherein said aperture means are operative to define said surface areas of each of said paths to be concentric.

39. The apparatus of claim 36 wherein said aperture means are operative to define one surface area of at least two of said paths to be common to said two paths.

40. The apparatus of claim 39 wherein said aperture means are operative to define said common surface area to be centrally located with respect to said at least one extended surface area defining each of said two paths.

41. The apparatus of claim 39 wherein said aperture means are operative to define said common surface areas as the detection surface area.

42. The apparatus of claim 41 wherein said aperture means are operative to define said illumination and sensing areas for at least one of said paths to be on opposite surfaces of said material.

43. Apparatus for effecting optical measurements relative to a material, comprising:

optical means, when said apparatus is disposed at a first predetermined distance from a surface of said material, for defining at least one illumination surface area and at least one detection surface area which are distinct and, when disposed at a second predetermined distance, for defining illumination and detection surface areas which are at least partially superimposed;

said optical means including means for illuminating said illumination area and for detecting optical information received from said detection area; and

means for processing signals detected by said optical means in accordance with appropriate modeling techniques to determine quantitative or qualitative characteristics of the material.

44. The apparatus as in claim 43 wherein said optical means, ~~when disposed~~ at said first distance, is operative to define at least one of said surface areas to be of extended

length at substantially constant spacing and distinct from another of said surface areas.

45. The apparatus as in claim 43 wherein said optical means, ~~when disposed~~ at said first distance, is operative to define a plurality of distinct illumination surface areas and at least one detection surface area, whereby a plurality of different transmission paths are defined in said specimen.

46. The apparatus as in claim 45 wherein said optical means, ~~when disposed~~ at said first distance, is operative to define at least one of said illumination surface areas as extended in length.

47. The apparatus as in claim 45 wherein said optical means, ~~when disposed~~ at said first distance, is operative to define said at least one detection surface area as extended in length.

48. The apparatus as in claim 43 wherein said optical means, ~~when disposed~~ at said first distance, is operative to define at least one of said illumination surface areas and said at least one detection surface areas as extended and parallel.

49. The apparatus as in claim 43 wherein said optical means, ~~when disposed~~ at said first distance, is operative to

define at least one of said surface areas to be extended and to define another of said surface areas to be distinct and contained within the boundary defined by said extended surface area.

50. The apparatus as in claim 43 wherein said optical means, ~~when disposed~~ at said first distance, is operative to define said illumination and detection surface areas to be parallel.

51. The apparatus as in claim 43 wherein said optical means, ~~when disposed~~ at said first distance, is operative to define said illumination and detection surface areas to be concentric.

52. The apparatus as in claim 43 wherein said optical means, ~~when disposed~~ at a plurality of said second distances, is operative to define a plurality of illumination and detection surface areas which are at least partially superimposed corresponding to said plurality of said second distances.--